

UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 6413

CSAH NO. 6

OVER THE

CALDWELL BROOK

DISTRICT 1 - KOOCHICHING COUNTY



PREPARED FOR THE
MINNESOTA DEPARTMENT OF TRANSPORTATION
BY
COLLINS ENGINEERS, INC.
JOB NO. 5221

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 7003, Bents 1 and 2 and North and South Abutments, were found to be in good to satisfactory condition with no significant deterioration. The timber piles of the units were typically firm and sound with random minor checking, although with more extensive checking and splitting present at two piles. There was a light to moderate accumulation of timber debris observed throughout the bridge and around most of the piers, especially across the face of the North Abutment. The channel bottom at the bridge appeared stable with no significant scour noted.

INSPECTION FINDINGS:

- (A) The timber piles typically exhibited moderate weathering with random checking up to 1/2 inch wide. The connection hardware typically exhibited minor corrosion with no appreciable loss of section.
- (B) The timber pile cap exhibited a 1-inch-wide split along the eastern end of Bent 2.
- (C) The westernmost timber pile at the northwest wingwall exhibited up to 100 percent loss of section in the upper 2 feet and delamination with up to 2 inches of awl penetration possible along the remaining portion of the pile. This deficient pile has allowed up to 6 inches of wingwall displacement to the south.
- (D) A moderate accumulation of timber debris consisting of 2-inch-diameter and smaller branches was observed along the North Abutment.
- (E) The top of the northwest wingwall exhibited up to 4 inches of displacement to the south with no active loss of backfill observed.
- (F) The north and south timber cross bracing members at Bent 2 exhibited splits up to 5 feet long with failed lower connections to the easternmost and westernmost piles, respectively.

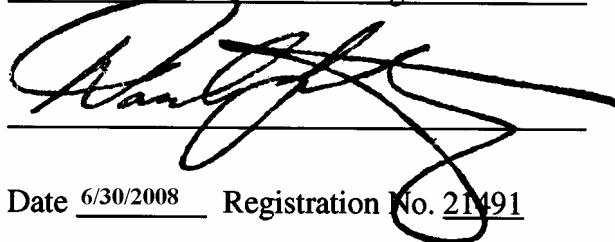
- (G) The south timber cross bracing member at Bent 1 exhibited a split that was 5 feet long with a failed connection to the easternmost pile.
- (H) A light accumulation of timber debris was scattered along the channel bottom from the South Abutment to Bent 2.
- (I) The easternmost pile at Bent 2 was delaminated from the top of the pile down 3 feet with up to 3 inches of awl penetration possible.

RECOMMENDATIONS:

- (A) At this point, timber drift accumulation at the bridge is not excessive; however, it should be monitored, and if found to be progressing to an extent where excessive lateral loads may be exerted on the bridge or scour may be influenced, the drift may need to be removed at that time.
- (B) Replace timber cross bracing members with splits and failed connections.
- (C) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

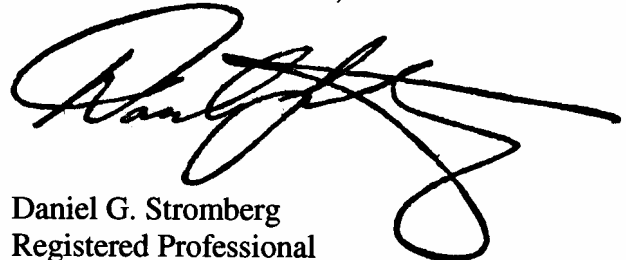
Daniel G. Stromberg



Date 6/30/2008 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.



Daniel G. Stromberg
Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 6413

Feature Crossed: Caldwell Brook

Feature Carried: CSAH NO. 6

Location: District 1 – Koochiching County

Bridge Description: The bridge superstructure consists of three spans of timber deck on multiple timber stringers. The superstructure is supported by two timber pile bents and two timber pile abutments. The bents are numbered 1 and 2 starting from the south end of the bridge.

2. INSPECTION DATA

Professional Engineer Diver: Daniel G. Stromberg, P.E., S.E.

Dive Team: John J. Loftus, Valerie Roustan

Date: August 27, 2007

Weather Conditions: Cloudy, 60 °F

Underwater Visibility: 1.0 foot

Waterway Velocity: Negligible / None

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: North and South Abutments and Bents 1 and 2.

General Shape: The bents each consists of five timber piles interconnected with timber cross bracing. The abutments each consists of a vertical timber plank breastwall flanked by wingwalls and supported by 10 timber piles.

Maximum Water Depth at Substructure Inspected: Approximately 3.8 foot.

4. WATERLINE DATUM

Water Level Reference: The top of pile cap at east end of Bent 1.

Water Surface: The waterline was approximately 7.0 feet below reference.
Assumed Waterline Elevation = 93.0 feet.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 7

Item 61: Channel and Channel Protection: Code 6

Item 92B: Underwater Inspection: Code B/08/07

Item 113: Scour Critical Bridges: Code K/95

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

 Yes X No



Photograph 1. Overall View of the Structure, Looking Southeast.



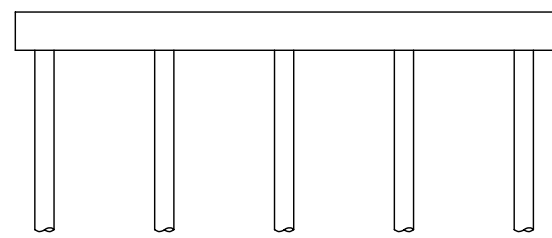
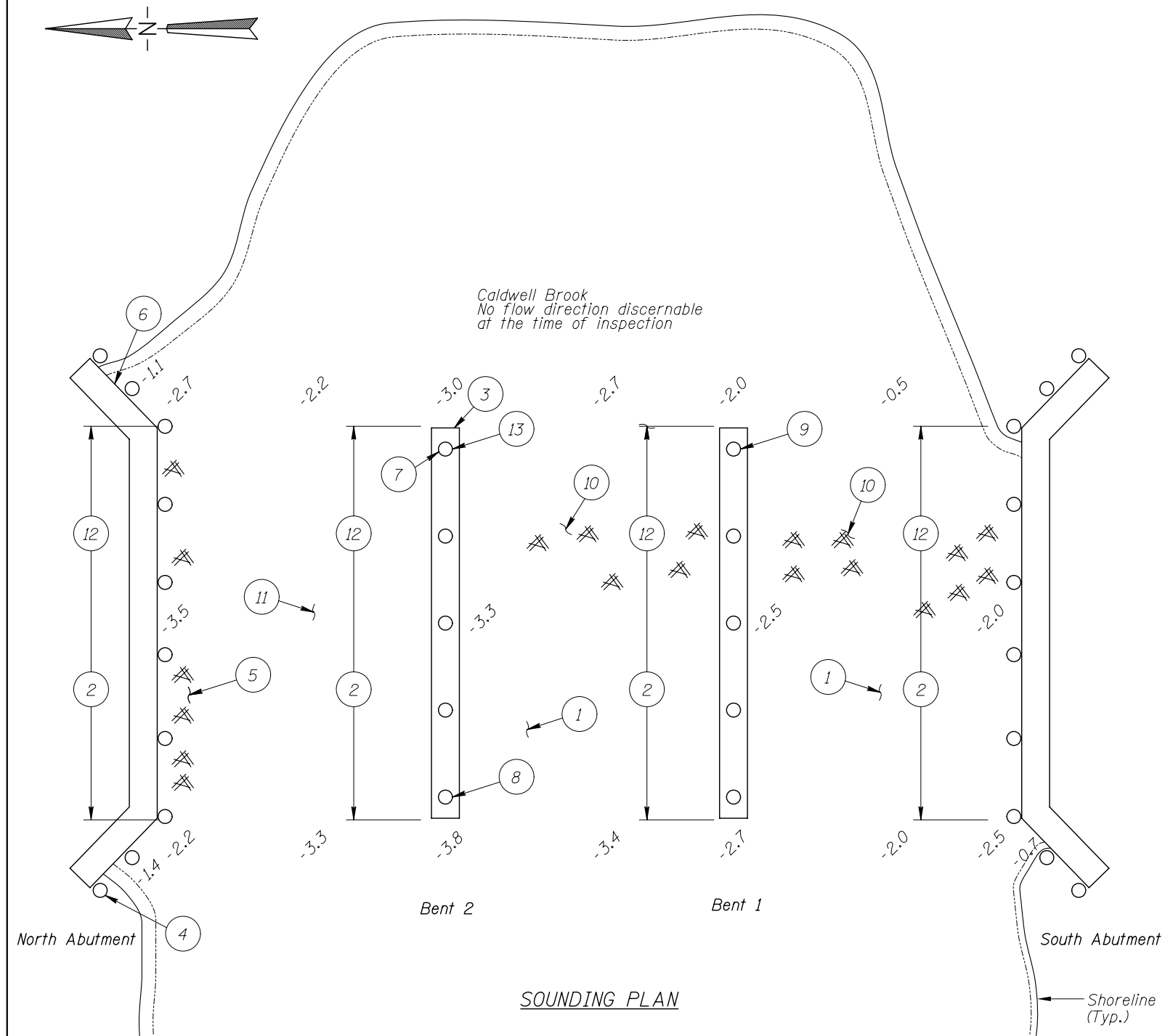
Photograph 2. View of the South Abutment and Bent 1, Looking Southeast.



Photograph 3. View of Bents 1 and 2, Looking Northwest.



Photograph 4. View of North Abutment and Bent 2, Looking Northwest.



TYPICAL PIER ELEVATION

SOUNDING PLAN

GENERAL NOTES:

1. The North and South Abutments and Bents 1 and 2 were inspected underwater.
2. At the time of inspection, on August 27, 2007, the waterline was located approximately 7 feet below the top of the pier cap of the downstream end of Bent 1. Since insufficient bridge elevation information was available, a reference elevation of 100.0 was assumed. Based on the assumed reference, the waterline elevation was 93.0.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at midpoints between the substructure units as well as around the structures.

INSPECTION NOTES:

1. The channel bottom material consisted of firm silty clay with less than 3 inches of probe rod penetration.
2. The timber piles typically exhibited moderate weathering with random checking up to 1/2 inch wide.
3. The timber pile cap exhibited a 1-inch-wide split along the eastern end of the bent.
4. Timber pile exhibited up to 100 percent loss of section in the top 2 feet of pile and delamination with up to 2 inches of awl penetration along the remaining portion of the pile, which has allowed up to 6 inches of wingwall displacement to the south.
5. A moderate accumulation of 2-inch-diameter and smaller timber debris was observed along the North Abutment.
6. The top of the northeast wingwall exhibited up to 4 inches of displacement to the south with no active loss of backfill noted.
7. The north brace exhibited a 5-foot-long split with a failed connection to the easternmost pile at Bent 2.
8. The south brace exhibited a 3-foot-long split with a failed connection to the westernmost pile at Bent 2.
9. The south brace exhibited a 5-foot-long split with a failed connection to the easternmost pile at Bent 1.
10. A light accumulation of 6-inch-diameter and smaller timber debris was observed on the channel bottom extending from the South Abutment to Bent 2.
11. Channel bottom consisted of soft silt with up to 6 inches of probe rod penetration.
12. The connection hardware typically exhibited corrosion with no appreciable loss of section noted.
13. The easternmost pile of Bent 2 was delaminated from the top of the pile down 3 feet with up to 3 inches of awl penetration.

Legend

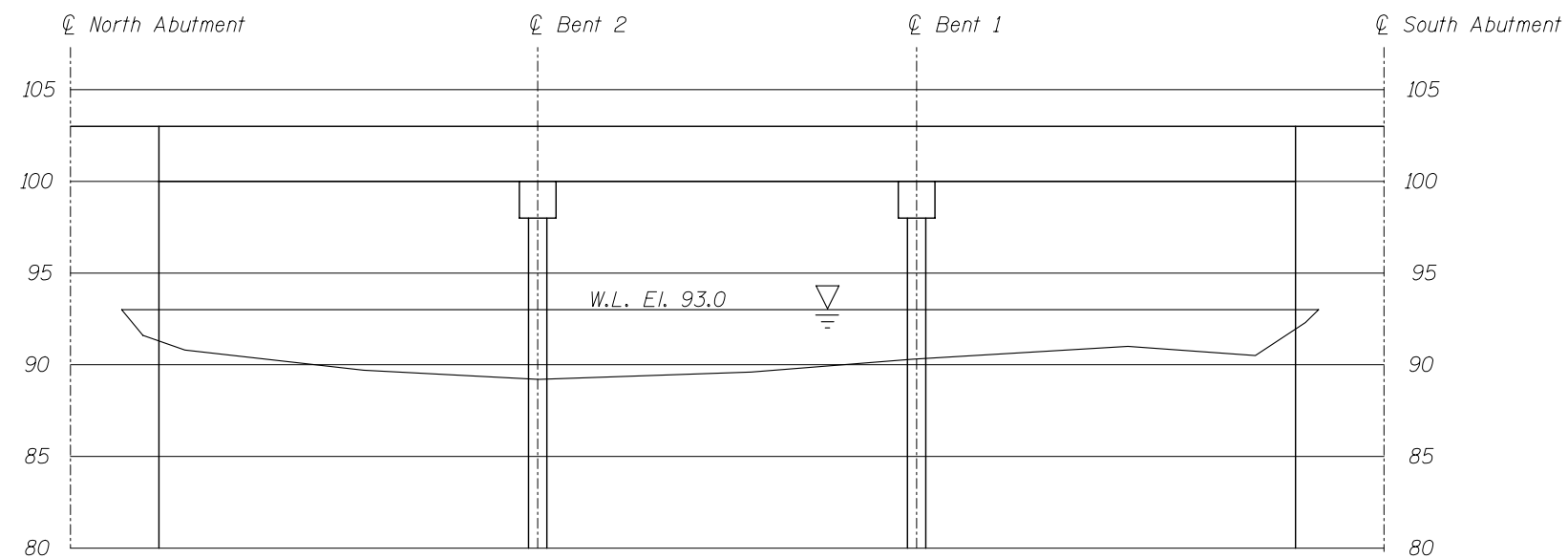
- 0.4 Sounding Depth (8/27/07)
 Timber Debris

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION

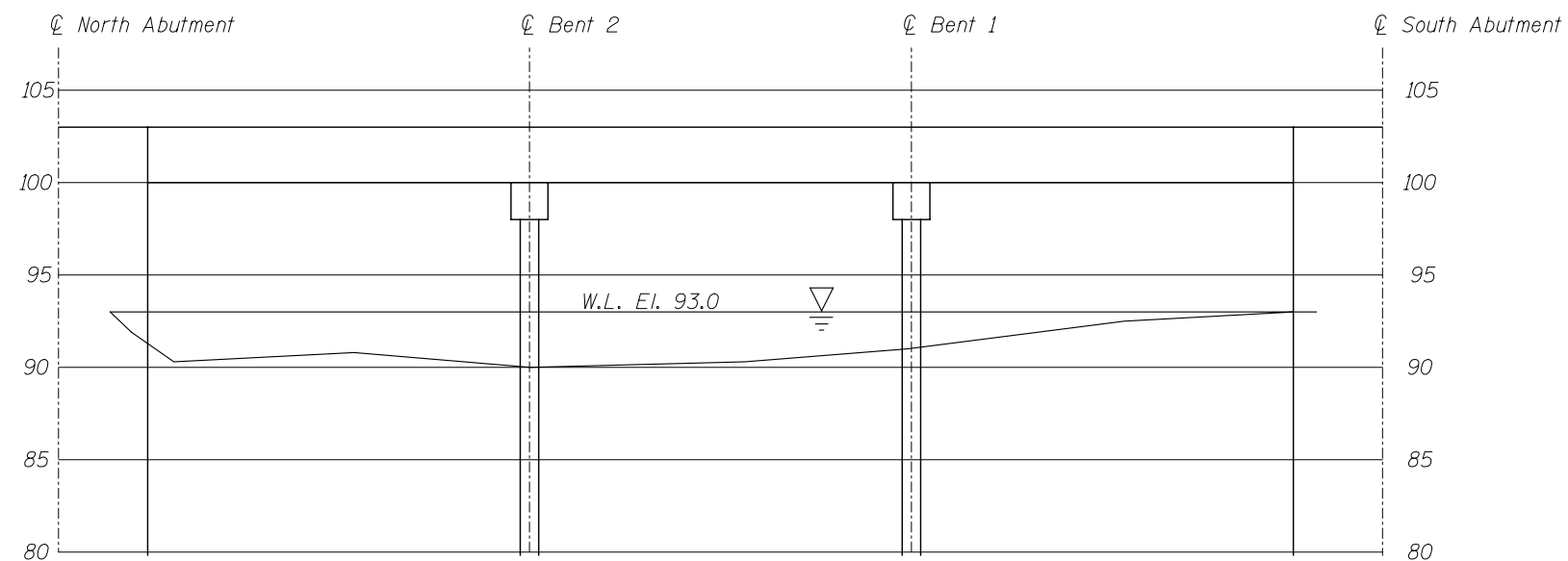
STRUCTURE NO. 6413
OVER THE CALDWELL BROOK
DISTRICT 1, KOOCHICHING COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: CAI	COLLINS ENGINEERS <small>123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: AUGUST, 2007
Checked By: MDK		Scale: NTS
Code: 52210037		Figure No.: 1



WEST FASCIA PROFILE



EAST FASCIA PROFILE

Note:
Refer to Figure 1 for General Notes.

MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION		
STRUCTURE NO. 6413 OVER THE CALDWELL BROOK DISTRICT 1, KOOCHICHING COUNTY UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: CAI	COLLINS ENGINEERS <small>123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: AUGUST 2007
Checked By: MDK		Scale: 1"=10'
Code: 52210037		Figure No.: 2

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: August 27, 2007
ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E., S.E.
BRIDGE NO: 7003 WEATHER: Cloudy, 60 °F
WATERWAY CROSSED: Caldwell Brook
DIVING OPERATION: X SCUBA SURFACE SUPPLIED AIR
 OTHER
PERSONNEL: John Loftus, Valerie Roustan
EQUIPMENT: Scraper, Lead Line, Sounding Pole, Probe Rod, Sounding Pole, Camera
TIME IN WATER: 8:45 A.M.
TIME OUT OF WATER: 8:15 A.M.
WATERWAY DATA: VELOCITY Negligible/None
VISIBILITY 1.0 foot
DEPTH 3.8 feet maximum at Bent 2
ELEMENTS INSPECTED: North and South Abutments and Bents 1 and 2
REMARKS: Overall, the submerged timber members were in good to satisfactory condition with no significant deterioration. The timber piles were typically firm and sound with random checking (up to 1/2 inch wide) throughout. Two piles exhibited delamination with up to 3 inches of awl penetration possible, with one of the piles also exhibiting up to 100 percent loss of section in the upper 2 feet. Both the northeast and northwest wingwalls exhibited minor displacement (up to 6 inches) to the south. Several of the cross bracing members exhibited splitting with failed connections to the piles. There was a light accumulation of timber debris on the channel bottom from the South Abutment to Bent 2 and a moderate accumulation along the North Abutment.

FURTHER ACTION NEEDED: YES X NO

At this point, timber drift accumulation at the bridge is not excessive; however, it should be monitored, and if found to be progressing to an extent where excessive lateral loads may be exerted on the bridge or scour may be influenced, the drift may need to be removed at that time.

Replace timber cross bracing members with splits and failed connections.

Reinspect the submerged substructure units at the normal maximum recommended interval of five (5) years.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 6413
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Daniel G. Stromberg, P.E., S.E.
WATERWAY CROSSED Caldwell Brook

INSPECTION DATE August 27, 2007

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

UNIT REFERENCE NO.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	SUBSTRUCTURE						CHANNEL					GENERAL					
			PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER (BRACING)	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	North Abutment	3.5'	7	7	N	8	N	7	8	8	7	6	6	N	N	7	N	N	N
	Bent 1	3.8'	7	7	N	9	7	7	8	N	N	7	7	N	N	7	N	N	N
	Bent 2	2.7'	7	7	N	9	7	7	8	N	N	7	7	N	N	7	N	N	N
	South Abutment	2.5'	7	7	N	9	N	7	8	8	7	7	7	N	N	7	N	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, the submerged timber members were in good to satisfactory condition with no significant deterioration. The timber piles were typically firm and sound with random checking (up to 1/2 inch wide) throughout. Two piles exhibited delaminations with up to 3 inches of awl penetration possible, with one of the piles also exhibiting up to 100 percent loss of section in the upper 2 feet. Both the northeast and northwest wingwalls exhibited minor displacement (up to 6 inches) to the south. Several of the cross bracing members exhibited splitting with failed connections to the piles. There was a light accumulation of timber debris on the channel bottom from the South Abutment to Bent 2 and a moderate accumulation along the North Abutment.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO. USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.